

FIG. 1

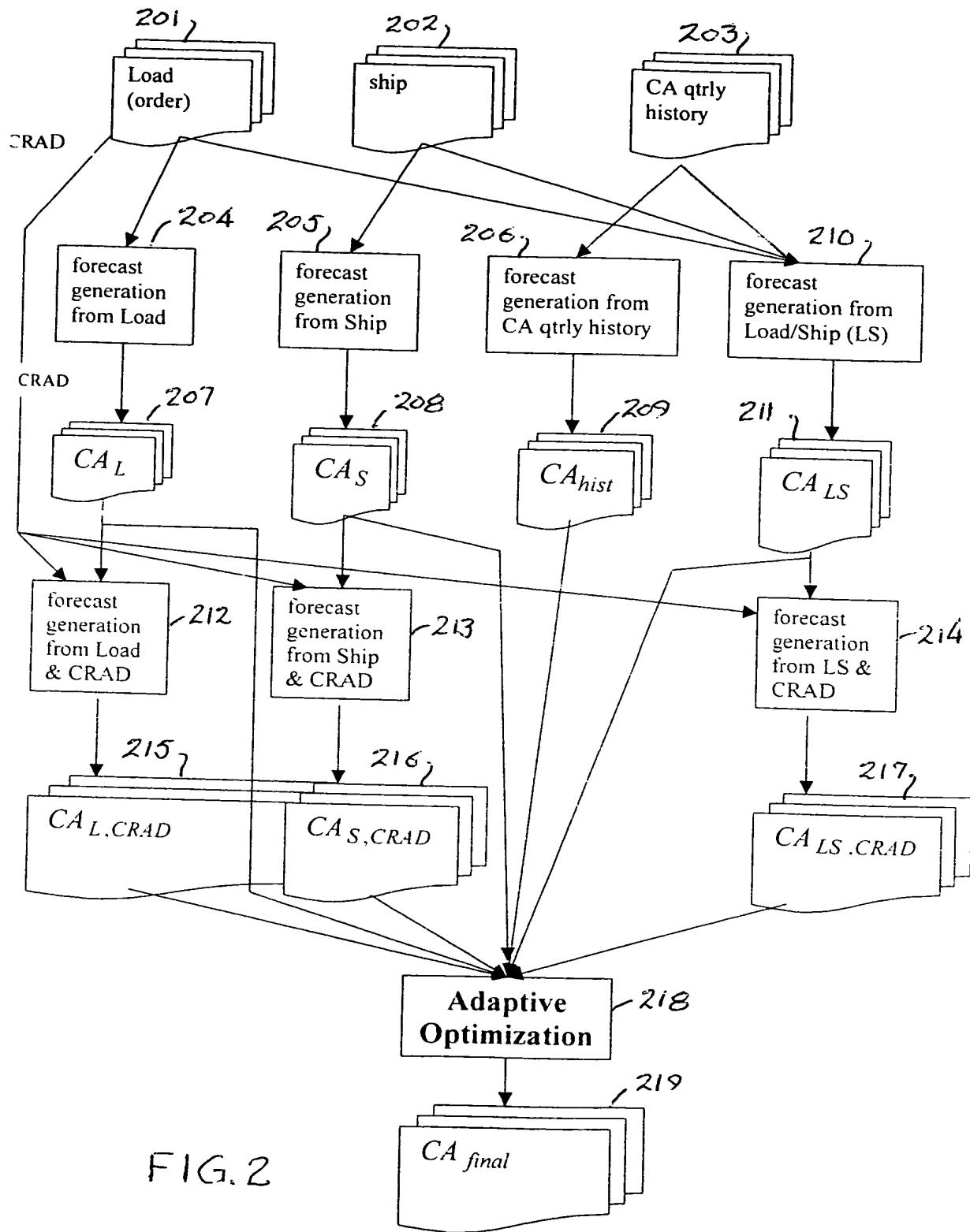


FIG. 2

3i_j

Compute $\gamma_{j,i} = \frac{L_{ji}}{CA_i}$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week #, L_{ji}, CA_i is the load and CA

32_j

Compute sample mean and sample sigma $\bar{\gamma}, S_{\gamma}$ of $\gamma_{j,i}$

33_j

Compute α, β with $\alpha = \bar{\gamma}^2 / S_{\gamma}^2, \beta = S_{\gamma}^2 / \bar{\gamma}$

34_j

Compute mean and sigma of CA forecast by: $\mu_{CA} = L_j / (\beta(\alpha - 1)), \sigma_{CA} = \frac{L_j}{\beta|\alpha - 1|\sqrt{\alpha - 2}}, L_j$: current qd load for week j

35_j

CA_L with mean $\mu_{L,CA}$, sigma $\sigma_{L,CA}$

FIG. 3

41)

Compute $\gamma_{S,j,i} = \frac{S_{ji}}{CA_{ji}}, i = 1, \dots, N, N : total number of quarters of history, j = 1, \dots, 13, j : week \#, S_{ji}, CA_{ji} \text{ is the ship and CA}$

42)

Compute sample mean and sample sigma $\bar{\gamma}, S_{\gamma}$ of $\gamma_{S,j,i}$

43)

Compute α, β with $\alpha = \bar{\gamma}^2 / S_{\gamma}^2, \beta = S_{\gamma}^2 / \bar{\gamma}$

44)

Compute mean and sigma of forecast for CA by: $\mu_{S,CA} = S_j / (\beta(\alpha - 1)), \sigma_{S,CA} = \frac{S_j}{\beta|\alpha - 1|\sqrt{\alpha - 2}}, S_j : current week qid ship$

45)

CA_S with mean $\mu_{S,CA}$, sigma $\sigma_{S,CA}$

FIG. 4

501,

Compute $\gamma_{L,ji} = \frac{L_{ji}}{CA_{ji}}$, $i = 1, \dots, N$, N : total number of quarters of history, $N > 2$; $j = 1, \dots, 13$, j : week#, L_{ji} , CA_j is the load and CA

502,

Compute $S_{L,ji} = \frac{S_{ji}}{L_{ji}}$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week#; L_{ji} , S_{ji} is the load and ship

503,

Compute $S_{L\gamma,j} = \sum_{i=1}^N S_{Lji} \gamma_{L,ji}$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week#;

504,

Compute $S_{L\gamma,j} = \sum_{i=1}^N S_{Lji}^2 \gamma_{L,ji}$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week#;

505,

Compute $S_{Lw,j} = \sum_{i=1}^N S_{Lji} w_i$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week#; w_i is the weight factor

506,

Compute $\gamma_{wj} = \sum_{i=1}^N \gamma_{ji} w_i$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week#; w_i is the weight factor

507,

Compute $W = \sum_{i=1}^N w_i$, $i = 1, \dots, N$, N : total number of quarters of history, w_i is the weight factor

508,

Compute $a = \frac{S_{Lwj} \gamma_{wj} - WS_{L\gammawj}}{WS_{L\gammawj}^2 - S_{Lwj}^2}$, $i = 1, \dots, N$, N : total number of quarters of history

509,

Compute $b = \exp \left\{ \frac{\gamma_{wj} + aS_{L\gammawj}}{W} \right\}$, $i = 1, \dots, N$, N : total number of quarters of history

510,

Compute historical error $\varepsilon_{ji} = CA_i - L_{ji} / bS_{Lji}^{-a}$, $i = 1, \dots, N$, N : total number of quarters of history

A1

FIG. 5A

A1

511,

Compute $\sigma_{LSj} = N^{-1} \sqrt{\sum_{i=1}^N \varepsilon_{ji}^2}$, N : total number of quarters of history

512,

Compute current week forecast of Load to CA ratio by $\gamma_{LSj} = b(S_j / L_j)^{-a}$, j = current week #

513,

Compute current week forecast of CA by $\mu_{LSj} = L_j / \gamma_{LSj}$, j = current week #

514,

CA_{LS} with mean μ_{LSj} , sigma σ_{LSj}

FIG.5B

601)

Compute the mean and sigma for the histogram constructed from all the dates for the CRAD for each individual outstanding order on the order book as of any given week in history, and call it $\mu_{CRAD,i}$ and $\sigma_{CRAD,ji}$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week #;

602)

Compute $SNR_{ji} = \ln \left\{ \frac{\mu_{CRAD,ji}}{\sigma_{CRAD,ji}} \right\}$ $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week #

603)

Compute $\varepsilon_{ji} = CA_{ji} - \mu_{Lji}$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week #

604)

Compute $\varepsilon_{SNRj} = \sum_{i=1}^N \varepsilon_{ji} SNR_{ji}$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week #

605)

Compute $\varepsilon_{SNRwj} = \sum_{i=1}^N \varepsilon_{ji} SNR_{ji} w_i$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week #

606)

Compute $SNR_{wj} = \sum_{i=1}^N SNR_{ji} w_i$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week #

607)

Compute $\varepsilon_{wj} = \sum_{i=1}^N \varepsilon_{ji} w_i$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week #

608)

Compute $SNR_{sq,wj} = \sum_{i=1}^N SNR_{ji}^2 w_i$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week #

609)

Compute $\varepsilon_{sq,wj} = \sum_{i=1}^N \varepsilon_{ji}^2 w_i$, $i = 1, \dots, N$, N : total number of quarters of history, $j = 1, \dots, 13$, j : week #

R1

FIG. 6A

B1

610_j

Compute $W = \sum_{i=1}^N w_i, i = 1, \dots, N, N : \text{total number of quarters of history}$

611_j

Compute $a_j = \frac{-S_{Lw_j} \gamma_{wj} + WS_{Lw_j}}{WS_{L^2 w_j} - S_{Lw_j}^2}, j = 1, \dots, 13, j : \text{week \#}$

612_j

Compute $b_j = \exp\left\{\frac{\gamma_{wj} + a_j S_{Lw_j}}{W}\right\}, j = 1, \dots, 13, j : \text{week \#}$

613_j

Compute historical residual error fit error

$\delta_{ji} = \varepsilon_{ji} - b_j - a_j * \text{SNR}_{ji}, i = 1, \dots, N, N : \text{total number of quarters of history}, j = 1, \dots, 13, j : \text{week \#}$

614_j

Compute sigma of forecast $\sigma_{L,CR4D} = N^{-1} \sqrt{\sum_{i=1}^N \delta_{ji}^2}, N : \text{total number of quarters of history}$

615_j

Compute $\mu_{CR4D,j}, \sigma_{CR4D,j}, \text{SNR}_j, j = 1, \dots, 13, j : \text{week \#}$ just like in step 6.1 and 6.2 except that it is for current quarter and not history (therefore subscript j)

616_j

Compute $\mu_{L,CA,CR4Dj} = \mu_{L,CAj} + b_j + a_j \text{SNR}_j, j = 1, \dots, 13, j : \text{week \#}$

617_j

$CA_{L,CR4D}$ with mean $\mu_{L,CR4D}$, sigma $\sigma_{L,CR4D}$

FIG. 6B

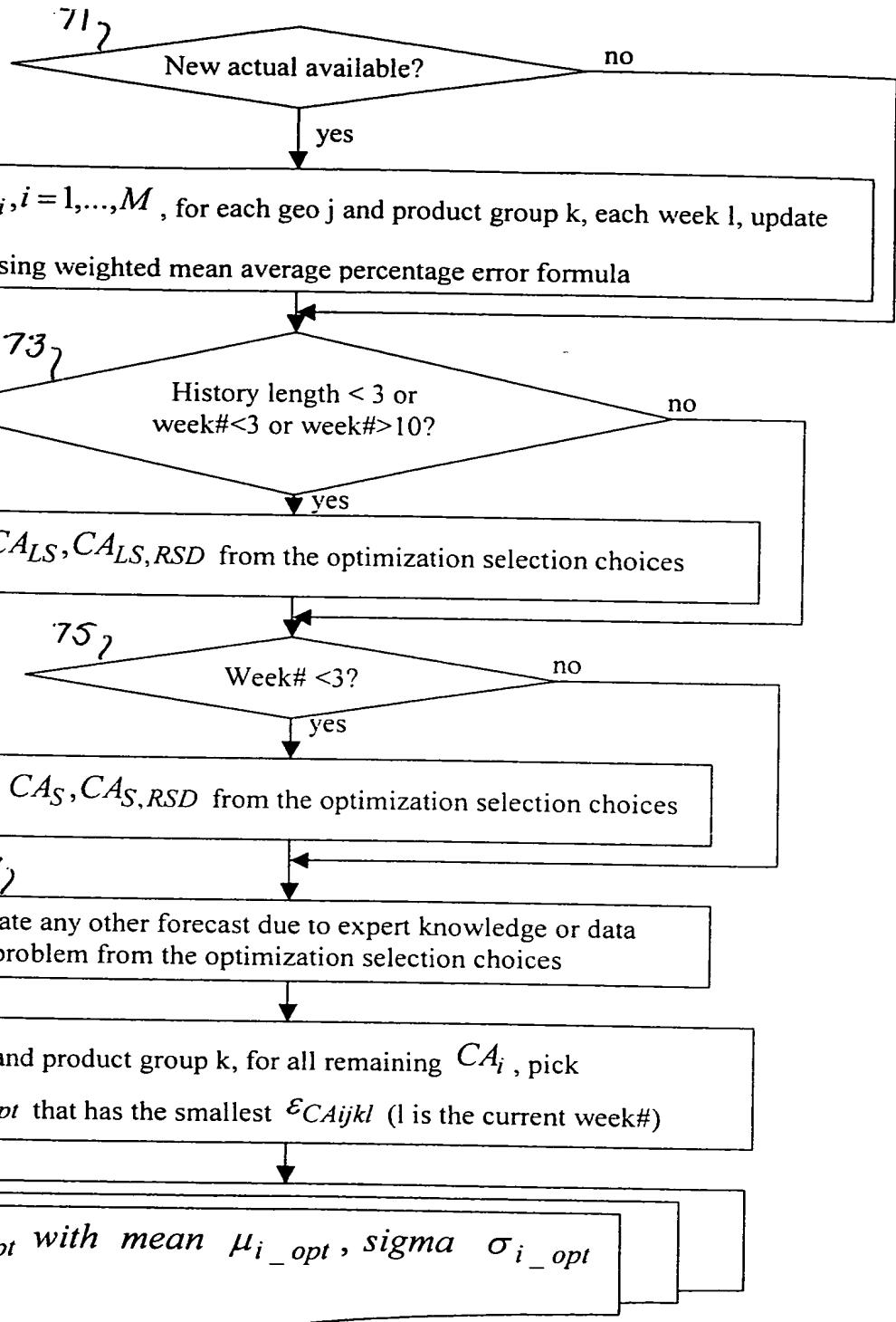
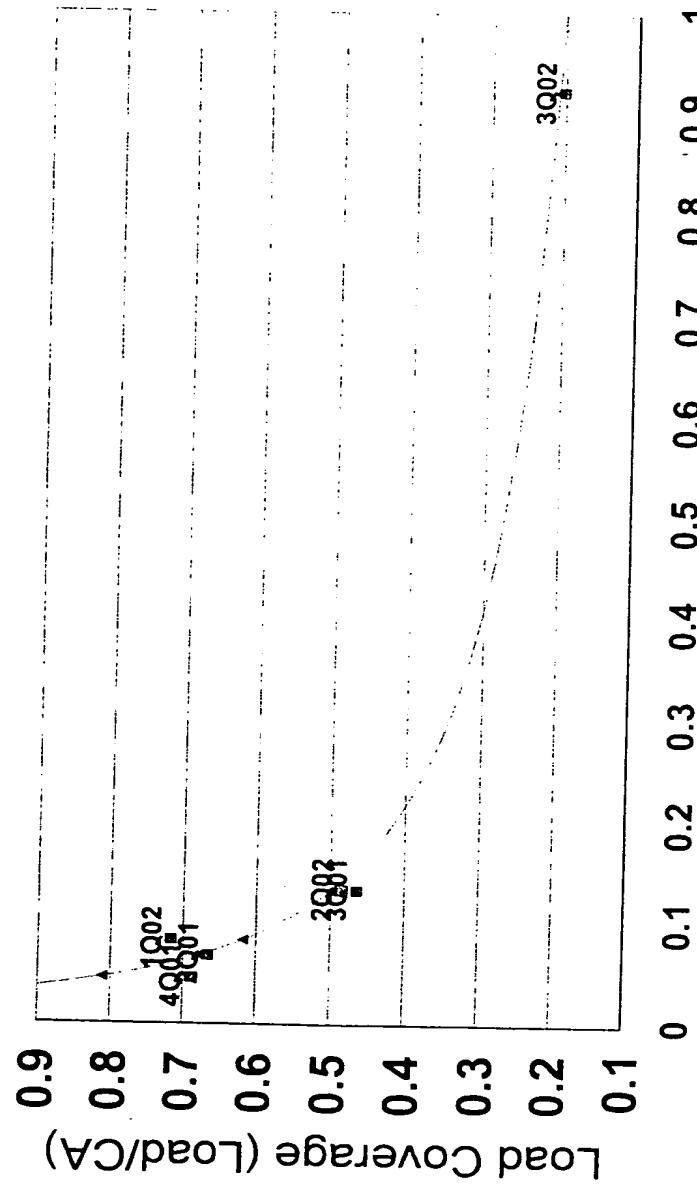


FIG. 7

Load/CA vs Ship/Load, week 5



Ship/Load

FIG. 8

Load/CA vs Ship/Load, week 9

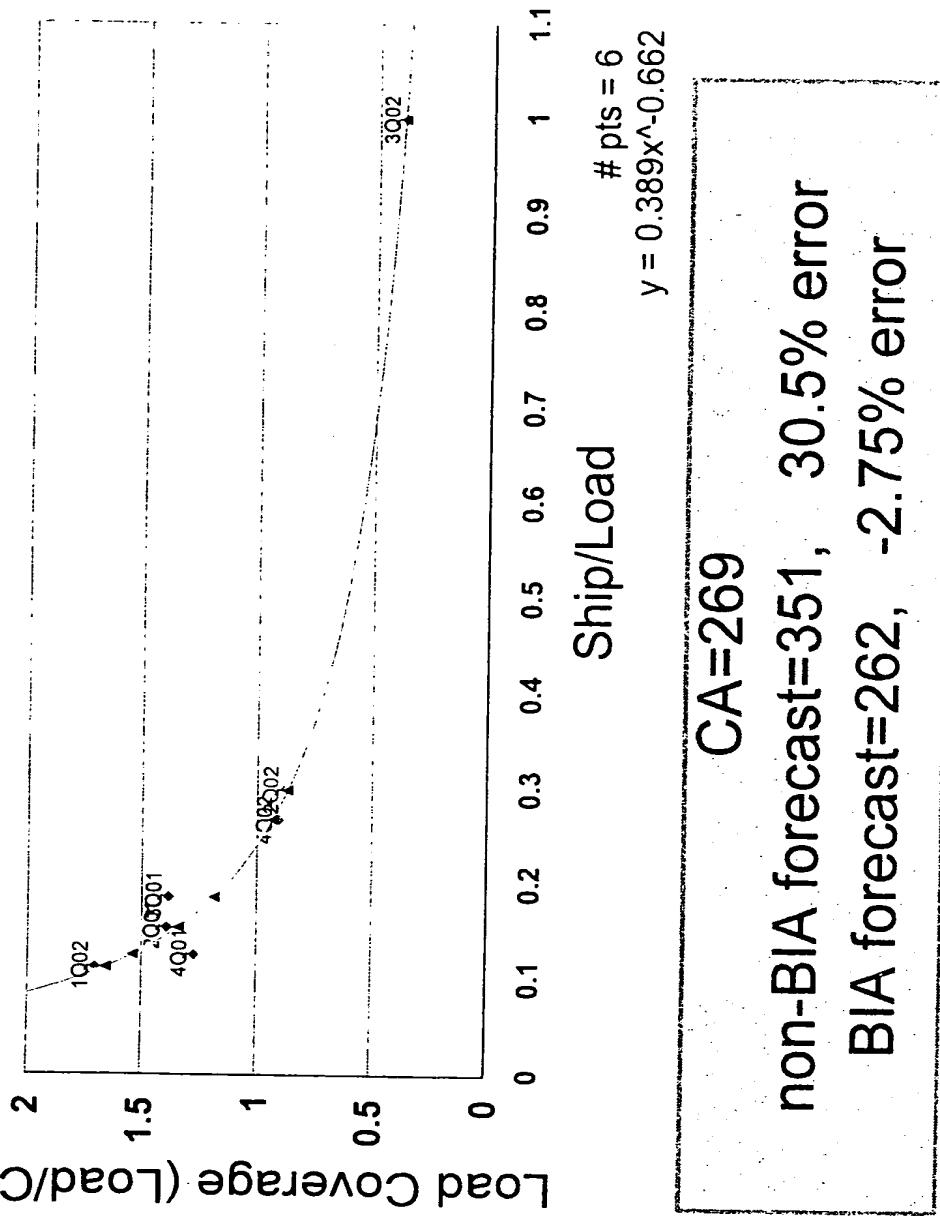


FIG.9

CA perc error vs crad snr

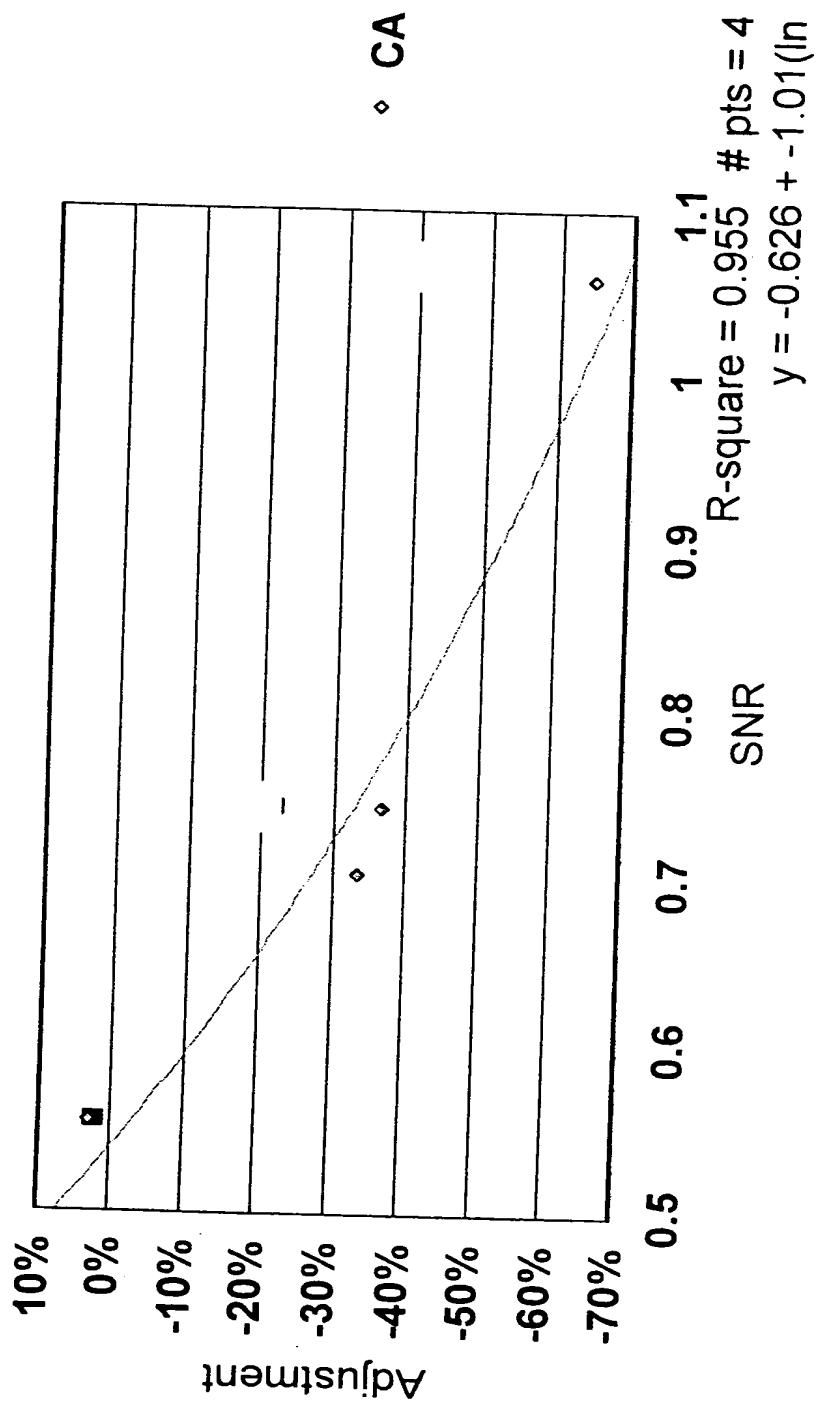
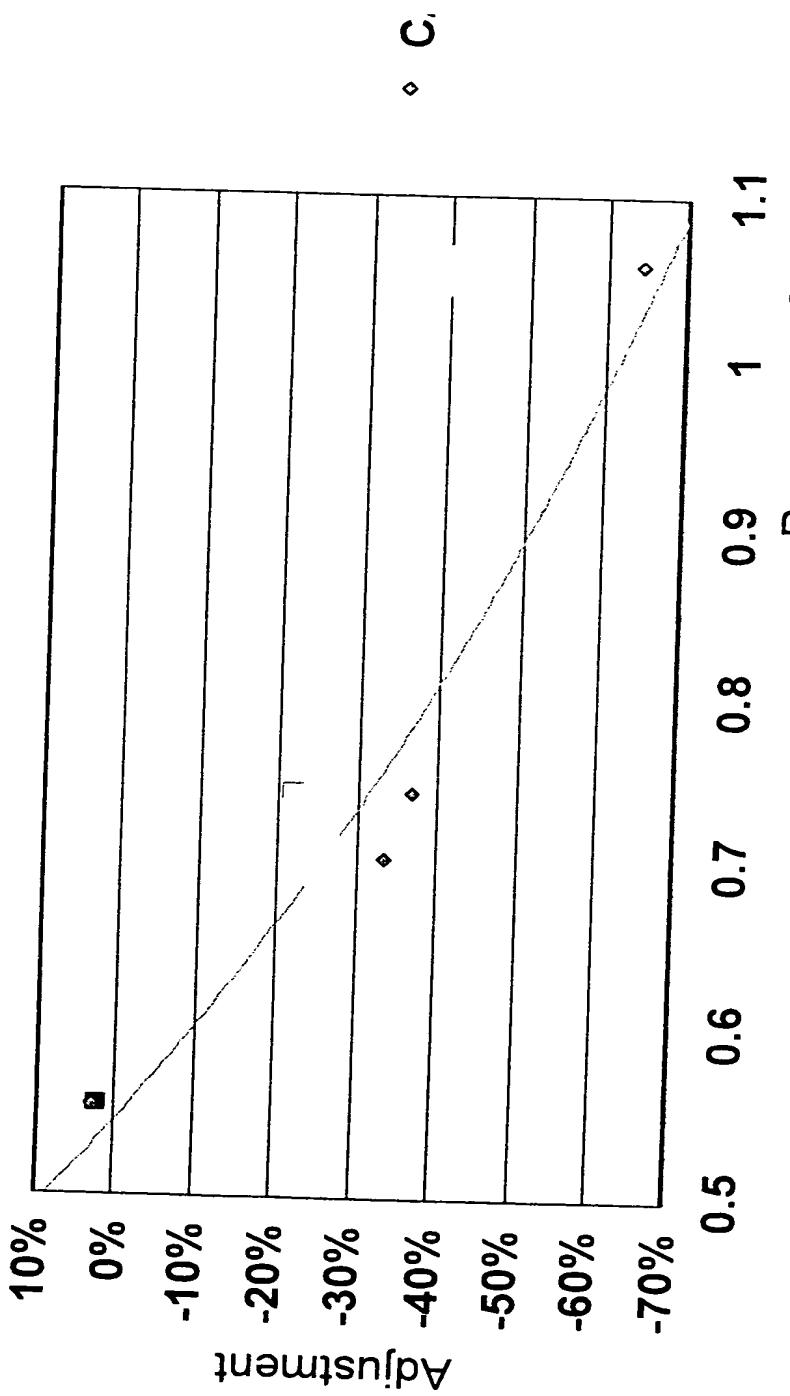


FIG. 10

CA perc error vs c_{rad} snr,fcst



R-square = 0.963 # pts =
 $y = -0.613 + -1.01(l)$

FIG. 11

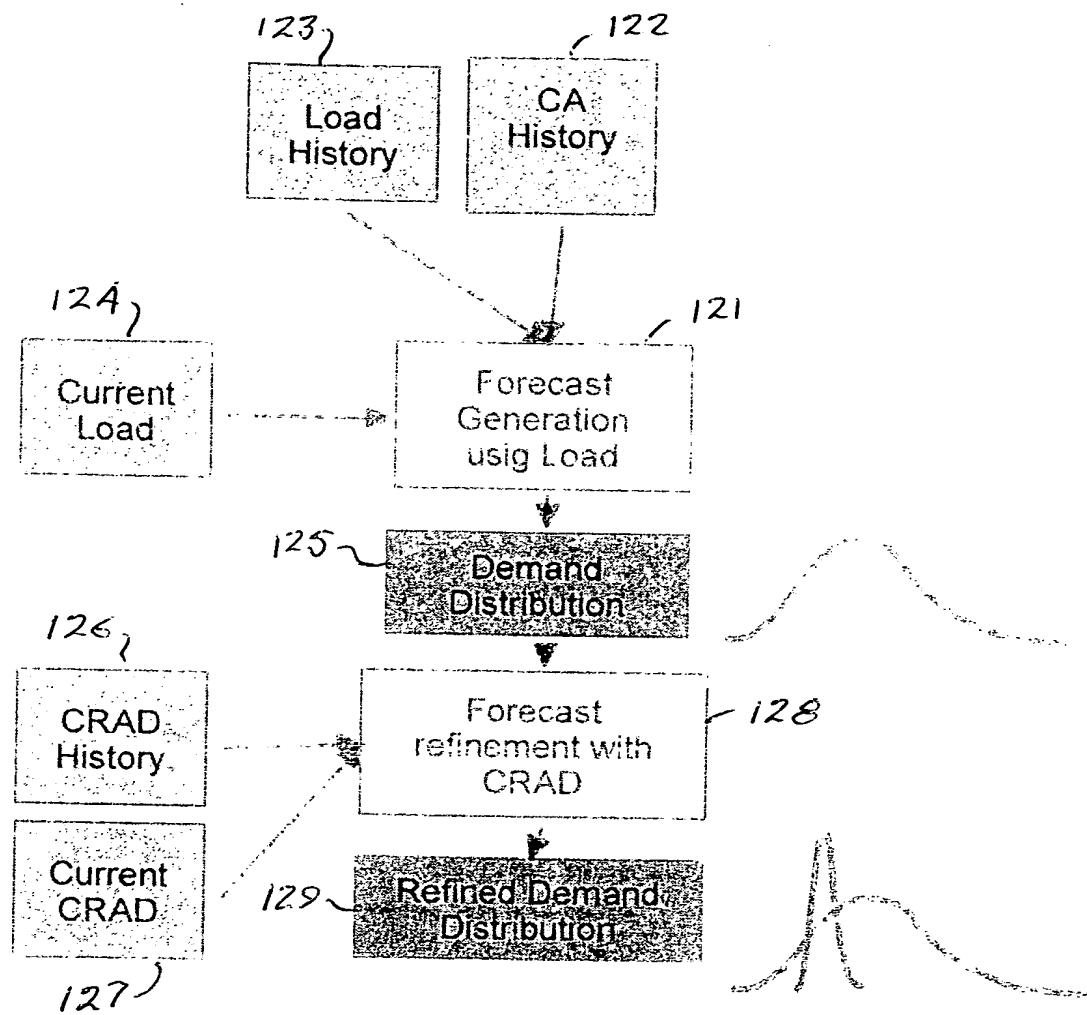


FIG.12